A new species of *Diascia* (Scrophulariaceae) from the Eastern Cape (South Africa), with notes on other members of the genus in that region

K.E. Steiner

Compton Herbarium, National Botancial Institute, Kirstenbosch, Private Bag X7, Claremont 7735 Republic of South Africa
(e-mail: steiner@nbict.nbi.ac.za)

Received 3 December 1998; revised 3 March 1999

A new species of *Diascia* from the former Transkei (Eastern Cape) is described and two species (*D. aliciae* Hiern and *D. racemulosa* Benth.) synonomized by Hilliard and Burtt (1984) are re-instated as distinct. All three species are fully illustrated and a distribution map is provided. The new species, *D. esterhuyseniae* K. E. Steiner, is closely related to *Diascia cordata* N. E. Br., but differs from that species in having pedicels and sepals that are glandular pubescent, not glabrous, and in having spurs that are shorter and mostly more or less parallel, not widely divergent from the base. *Diascia esterhuyseniae* is known only from hilltops near Engcobo in the Eastern Cape, whereas *D. cordata occurs* in the Drakensberg and its foothills in Kwazulu-Natal. A key is provided to the species that overlap in distribution with *D. esterhuyseniae, D. racemulosa* and *D. aliciae*.

Keywords: *Diascia*, new species, pollination, *Rediviva*, Scrophulariaceae, South Africa.

Introduction

Studies made since the last revision of *Diascia* section *Racemosae* (Hilliard & Burtt 1984) have brought to light three problems that need to be rectified with respect to species occurring in the former Transkei region of the Eastern Cape. First, *D. transkeiana* Hilliard & Burtt must be reduced to synonomy, because the designated holotype is conspecific with *D. mollis* Hilliard & Burtt, second, a new species based on material originally collected by Esterhuysen (BOL 29250) and cited under *D. transkeiana* needs to be formally described, and third, *D. aliciae* Hiern needs to be reinstated as a species distinct from *D. racemulosa* Benth. Three other species, *D. mollis, D. rigescens* Benth., and *D. personata* Hilliard & Burtt occur in coastal and lowland Transkei and could conceivably be confused with one of the three species described here. To prevent this, a key to all five species is provided.

Materials and Methods

All measurements and descriptions of flowers and associated structures were prepared from living material. For the description of leaves and other vegetative parts, a combination of fresh and dried material was used. Chromosome counts were prepared following Steiner (1996). Breeding systems information is derived from field collected specimens that were cultivated at Kirstenbosch.

Synonomy

Diascia mollis Hilliard & Burtt in J1. S. Afr. Bot. 50 (3): 269–340 (1984). Type: Eastern Cape, 3128 (Umtata): Libode Distr., near Misty Mount, Corana Location (–DB), 12 April 1954, *Barker 8242* (NBG!, holo).

Diascia transkeiana Hilliard & Burtt in Notes RBG Edinb. 45(1): 87–88 (1988). Type: Eastern Cape, 3128 (Umtata): Tsolo Distr., Nqadu Forest (–BC), 18 Feb. 1986, *Hutchings 2108* (E, holo; K!, KEI! iso.), syn. nov.

Live and pressed specimens of *D. transkeiana* were collected from the type locality at Nqadu and compared with both fresh and herbarium material of *D. mollis* from the type locality and from several other localities. No evidence was found to warrant recognition of two distinct species.

Species descriptions

1. ***Diascia esterhuyseniae*** K.E. Steiner sp. nov. *Diasciae cordati* N. E. Br. proxima, sed differt calcaris corollae brevioribus (4.4–7.6 vs. 7.3–9.9 mm), ± parallelo (apicibus excepto) non divergentibus, sepalis pilis glanduliferis non glabris.

TYPUS.—South Africa, Eastern Cape Province (3128CC): Ridges SE of St. Alban's Mission, *ca.* 21 km S of Engcobo, elevation *ca.* 1220 m, 16 Apr. 1997, *Steiner 3205* (NBG, holotypus; K, MO, NU, PRE, isotypi).

Rhizomatous perennial herb, crown of rootstock eventually woody and up to 25 × 15 mm in cross-section, stems one to many from the crown, tufted, simple or sparingly branched, up to 1000 mm long, rectangular in cross-section with a ridge on each corner, up to *ca.* 2 mm on a side, erect to decumbent, often climbing or scrambling up through shrubs. *Leaves* opposite and decussate, glabrous or with a few scattered glandular trichomes, lamina *ca.* 7.5–30 × 7–27 mm, ovate, apex acute to acuminate, base truncate to cordate, margins serrate, serrations often apiculate; petioles 1.0–3.0 mm long. *Flowers* in lax terminal racemes, with up to 4 open per raceme at one time; lowermost bract leaf-like, up to 8 × 4 mm, upper bracts reduced, *ca.* 3.0–5.2 × 2.0–3.0, broadly ovate, apex long acuminate, *ca.* as long or slightly longer than the lamina, base truncate to cordate, margins with 2 prominent teeth on each side near the base, glandular pubescent, pedicels *ca.* 11–31 mm long, filiform, glandular pubescent, ascending or spreading, curving upwards distally in fruit. *Calyx* lobes five, upper lobe *ca.* 3.0–3.2 × 1.1–1.2 mm, lateral lobes *ca.* 3.5–3.7 × 1.1–1.2 mm, lower lobes slightly longer and wider, *ca.* 3.7–4.0 × 1.4–1.6 mm, all lobes reflexed, lanceolate, acute, glandular pubescent. *Corolla* bilabiate, limb *ca.* 15–21 mm × 13–21 mm, upper lobes *ca.* 3.9–5.5 × 4.3–6.1 mm, oblong to ovate, apex rounded, base strongly oblique, lateral lobes *ca.* 5.2–7.3 × 6.0–8.4 mm, broadly ovate, apex rounded to subacute, base ± perpendicular to the axis of the lobe, lower lobe *ca.* 10.2–12.2 × 10.3–14.2 mm, broadly ovate to obovate, apex rounded, base ± perpendicular to the axis of the lobe, bearing a central patch of dark sessile glandular trichomes, all lobes pink to rose on the front and pinkish white to pale red on the back, glandular-puberulous, tube below the upper lip forming a shallow depression or concavity *ca.* 1.5–1.9 × 2.4 mm, with each side further depressed to form a translucent 'window', the two windows separated or rarely confluent, yellow with occasional red flecks; tube at base of lateral lobes spurred, spurs *ca.* 4.4–7.6 mm long (measured along inner side), projecting backwards and curving down and out, with a patch of dark purple sessile glandular

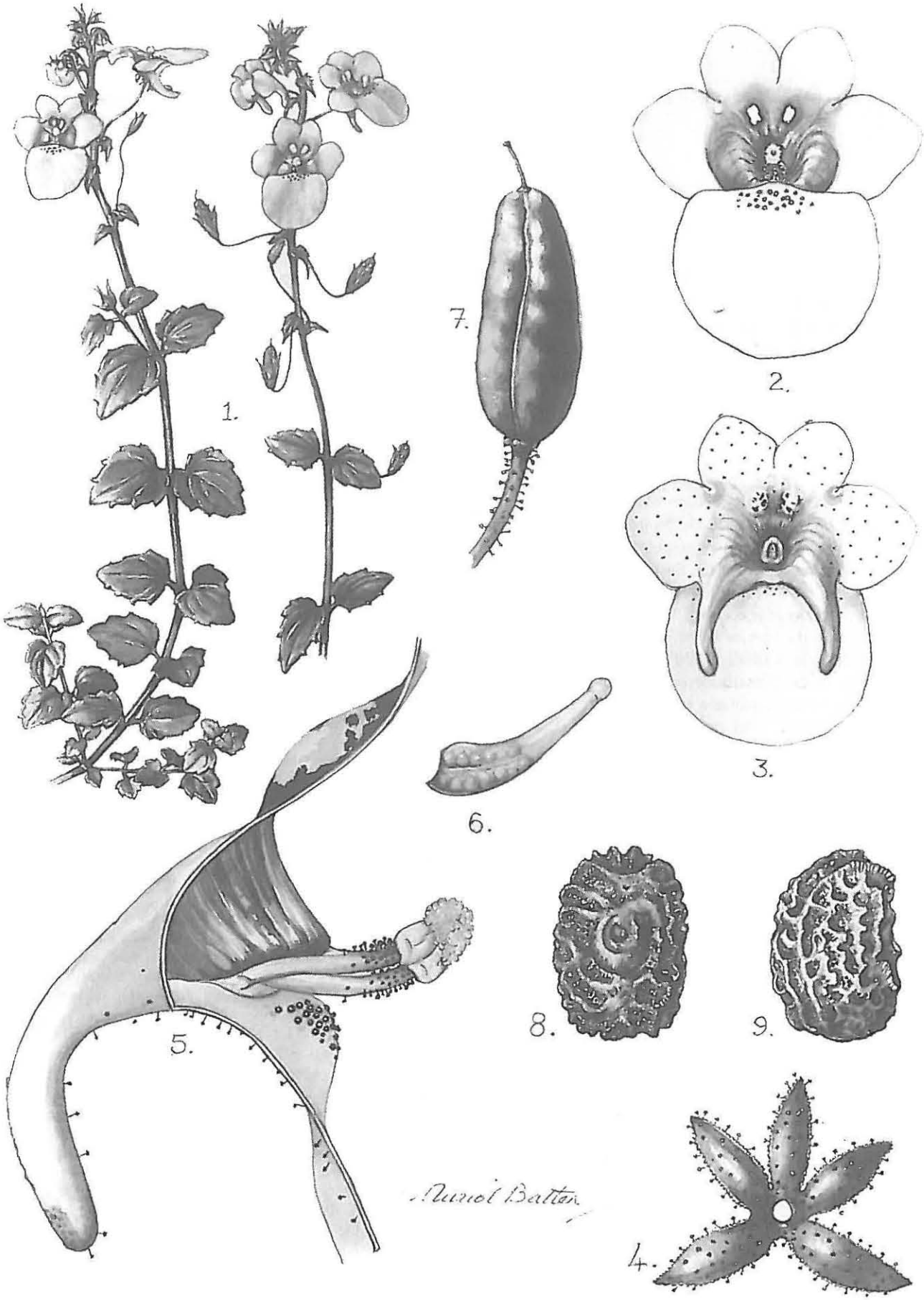

Figure 1 *Diascia esterhuyseniae*. **1**. Habit ×l. **2**. Flower, front view ×3.8. **3**. Flower, rear view ×3.8. **4**. Calyx ×6. **5**. Flower, longitudinal section ×12. **6**. Gynoecium ×12. **7**. Mature capsule ×6. **8**. Seed, ventral view ×25. **9**. Seed, lateral view ×25. Illustration from *Steiner 3204*.

trichomes on the inner face near the tips, gland patch *ca.* 2.4–4.3 mm long, greyish magenta from the outside; central portion of tube invaginated to form a stamen-bearing boss, boss *ca.* 1.9 mm high anticous to the stamens and 2.6–3.2 mm high posticous to the stamens, tube below lower lip raised slightly to form a palate-like extension of the lower lobe that is shallowly channelled below to accommodate the filaments. *Stamens* four, projecting outwards and curving upwards distally; anticous filaments *ca.* 2.3–2.6 mm long, twisted at the base to bring them into posticous position, ± straight except at base, posticous filaments (appearing anticous) *ca.* 1.7–2.1 mm long, bent upwards and somewhat outwards from the middle, all filaments glandular pubescent with black-capped trichomes; anthers *ca.* 0.5–1.0 mm long, strongly cohering, pollen yellow. *Ovary ca.* 1.1–1.2 × 0.9–1.0 mm, falciform-oblong to falciform-ovate in outline, green, with *ca.* 13–19 ovules; style *ca.* 1.5–1.8 mm long, stigma capitate, surrounded by the coherent anthers. *Capsule ca.* 4.6–8.9 × 2.3–3.5 mm, oblong to ovate in outline. *Seeds ca.* 1.2–1.6 mm long, *ca.* 4–13 per capsule, heavily and irregularly ridged (not winged), with a small pore in the centre of the ventral face (Figure 1). Chromosome number: 2n = 18.

Flowering Time

October–May

Diagnostic features

Diascia esterhuyseniae is the only perennial species other than *D. cordata* that has a shallow depression at the base of the upper corolla lobes that is usually divided [84% of the population at the type locality, (N = 25)] into two distinct translucent 'windows'. *Diascia austromontana* K. E. Steiner occasionally has the window divided by a narrow septum, but the main depression is much larger in that species (2.3–2.4 × 3.5–4.3 mm vs. 1.5–1.9 × 2.4 mm) (Steiner 1989). *Diascia austromontana* also has two discrete patches of glands at the base of the lower corolla lobe, whereas *D. esterhuyseniae* has a single central patch of glands in the same position. *Diascia mollis* and *D. ramosa* have similar depressions within a larger concavity, but in those species, the window tissue of the two depressions is always contiguous so that there is a single translucent window and not two distinct windows. The presence of two windows is the norm for annual species in section Racemosae, but rare among the perennials (Hilliard & Burtt 1984; Steiner unpubl.).

Etymology

This species is named in honour of Miss Elsie Esterhuysen who made the first collection of this plant while on a holiday at Holy Cross Mission near Engcobo in 1961.

Relationships

Diascia esterhuyseniae is most closely related to *Diascia cordata*, not only on the basis of the double window, but also in having two short stamens that curve upwards distally, relatively few seeds per capsule, a tube below the lower corolla lobe that is channelled to accommodate the filaments, a patch of glandular trichomes on the palate at the base of the lower corolla lobe (sometimes lacking in *D. cordata*), and a seed that is heavily ridged, but not winged. It differs from *D. cordata* in having shorter spurs (4.4–7.6 vs. 8.0–9.0 mm), spurs that are more or less parallel or divergent only near the tips (not divergent from the base), upper bracts in which the acuminate apex is very narrow and *ca.* one-half the total bract length, not *ca.* one-third or less, sepals that are glandular pubescent, not glabrous, and capsules that are *ca.* 4.6–8.9, not 3.0–5.0 mm. *D. esterhuyseniae* also shows some similarities with *Diascia ramosa*, including its scrambling habit, ovate, serrate leaves, highly ridged seed coat, shallowly concave window, and relatively few seeds per capsule. However, the colour (pink vs. bright orange), corolla size (15–21 × 13–21 mm vs. 7.1–9.3 × 7.3–9.6 mm) and the presence of spurs, immediately distinguish it from that species. Vegetatively, *D. esterhuyseniae* looks similar to the glabrous forms of *D. fetcaniensis* that are found from Maclear to Naudesnek, but that species has a window that is deeply concave to conical (not shallowly concave) and filaments that are straighter and longer (3.0–4.0 vs. 1.7–2.6 mm). The two additional depressions that occur within the main window depression in *D. esterhuyseniae*, are similar to those of *D. mollis*, but the main depression in that species is more deeply concave and never has a central partition that divides the window into two distinct translucent regions. *D. esterhuyseniae* also differs from *D. mollis* in having shorter filaments 1.7–2.6 vs. *ca.* 3.0 mm and in having a posticous filament that is bent upwards from the middle, not ± straight. The shape of the spurs also differs between *D. esterhuyseniae* and *D. mollis*. Whereas *D. esterhuyseniae* has spurs that are ± parallel or slightly divergent at the base, but diverging more strongly towards the tips, the spurs of *D. mollis* curve strongly towards each other, especially near the tips.

Distribution and habitat

Diascia esterhuyseniae is known only from two localities near Engcobo. It occurs on the top of ridges that form a more or less continuous arc from Engcobo to Egossa near St. Albans Mission Station. At the type locality, *D. esterhuyseniae* occurs on the top of a ridge on the margin of a small open forest patch with, among others, *Aloe arborescens* and a species of *Cussonia*. It does not occur inside the forest patch. The presence of *Usnea* in the branches of the forest-patch trees suggests that the ridge is often covered in mist. Plants grow in clay-loam soil of doleritic origin. Recently, two small plants were seen on the top of the dolerite ridge that is immediately south-west of the town of Engcobo in a habitat similar to the site near St. Albans. It is likely that the original collection by Miss Esterhuysen came from this conspicuous ridge which forms a backdrop to Engcobo.

Pollination and breeding system

Based on observations of plants cultivated at Kirstenbosch, *D. esterhuyseniae* is self-incompatible and, therefore, dependent on pollinators to set seed. The flowers, like most other *Diascia* species have twin spurs that contain oil-secreting glands at their tips. This would suggest that the primary pollinator is an oil-collecting bee (Steiner & Whitehead 1988, 1990, 1991). However, I have yet to observe such a bee at the type locality, despite visits in different seasons in three different years. The only floral visitors observed so far are small (*ca.* 6 mm long) pollen-collecting bees in the family Halictidae. Despite the absence of a specialist oil-collecting bee, fruit set for plants flowering at the St. Albans site in January 1998 (based on a census on Feb. 2) was *ca.* 37.8%. This suggests that small pollen collecting bees can, in some situations, effect reasonable fruit set in the absence of oil-collecting bees.

Specimens examined

Eastern Cape

—**3128** (Lady Frere): hills near Engcobo (–CA), 13 Oct. 1961, *Esterhuysen 29250* (BOL); rocky ridge above and SW of Engcobo (–CA), 10 Dec. 1998, *Steiner 3326* (NBG); ridges SE of St. Albans Mission (–CC), 20 Dec. 1990, *Cloete 622* (KEI); ibid., 3 Jan 1997, *Cloete et al. 4000*; Ridges SE of St. Albans Mission, *ca.* 21 km S of Engcobo (–CC), 15 Apr. 1997, *Steiner 3204* (PRE, NBG, MO); ibid., 2 Feb. 1998, *Steiner 3264* (MBG); ibid., 13 Dec. 1998, *Steiner 3333* (NBG).

The Esterhuysen collection (BOL 29250), from the hills about Engcobo, was recognised as a new species by Hilliard and Burtt

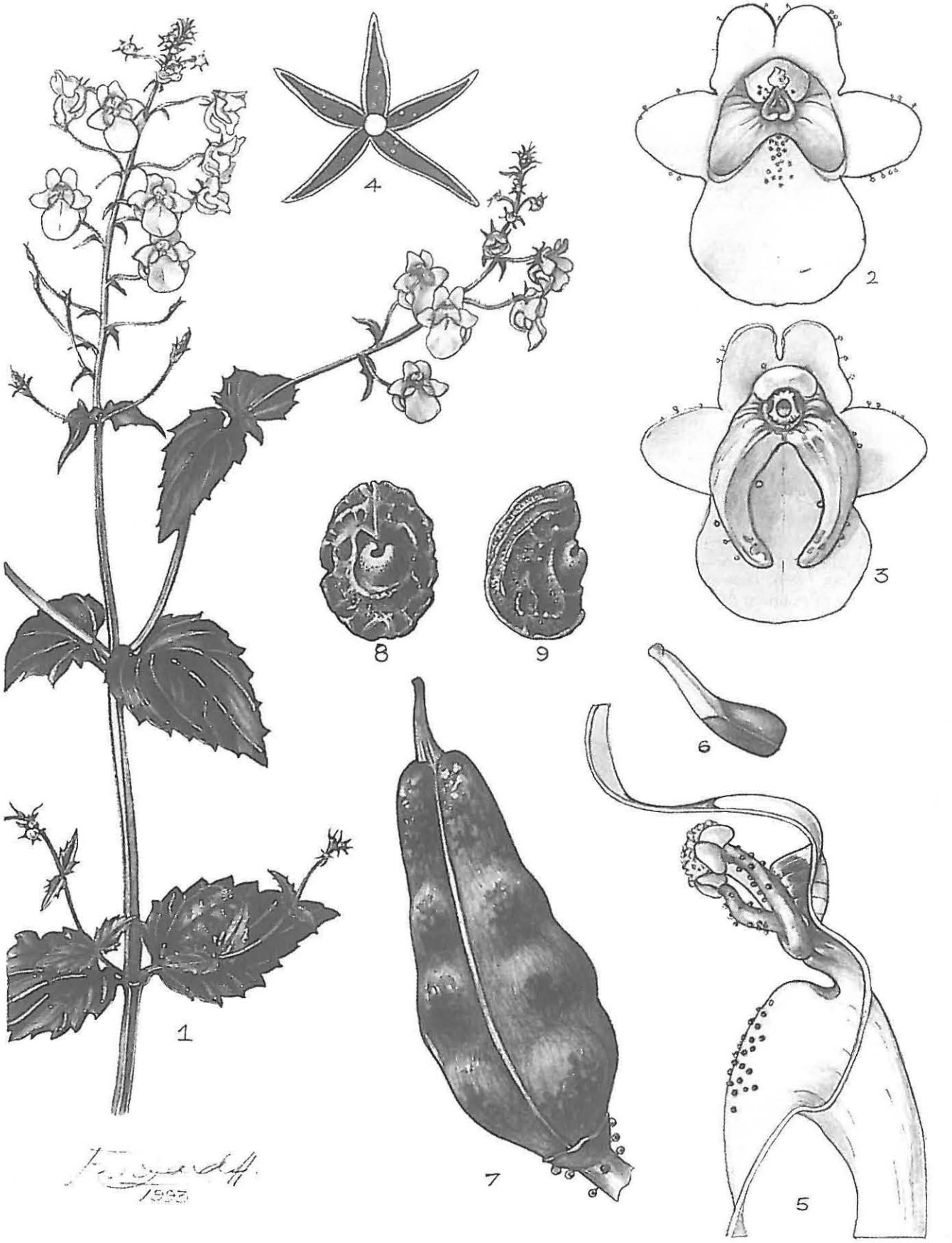

Figure 2 *Diascia aliciae*. **1**. Habit ×1. **2**. Flower, front view ×4. **3**. Flower, rear view ×4. **4**. Calyx ×6. **5**. Flower, longitudinal section ×12. **6**. Gynoecium ×12. **7**. Mature capsule ×12. **8**. Seed, ventral view ×25. **9**. Seed, lateral view ×25. Illustration from *Steiner 604*.

(1984), but they refrained from formally naming it because they felt the material was inadequate for a proper description. An additional collection, of what they believed to be the same species was collected from Nqadu, near Umtata, by Hutchings and this material together with the Esterhuysen specimen formed the basis of *Diascia transkeiana* Hilliard & Burtt (Hilliard & Burtt 1988). Unfortunately, the Nqadu specimen was designated as the holotype and it is not conspecific with the Engcobo collection. It is *Diascia mollis* Hilliard & Burtt, a species quite distinct from the Engcobo species (cf. illustration in Hilliard & Burtt 1988). This means that the designated holotype for *D. transkeiana* must fall into synonomy under *Diascia mollis* and a new name must be chosen for the Engcobo material.

Until recently, there was still inadequate material available to properly describe the Engcobo *Diascia*. A visit to the University of Transkei herbarium in 1996, revealed an additional collection (mis-identified as *D. cordata*) from *ca.* 21 km S of Engcobo (*Cloete 622*). This specimen was still inadequate for preparation of a good description, so Elize Cloete from the University of Transkei kindly returned to the site in January 1997 and collected fresh and pickled material for me. She also took me to the site in April 1997, so I could obtain material for illustration.

2. ***Diascia aliciae*** Hiern in Thiselton-Dyer, Fl. Cap 4(2): 155 (1904); Skan, Curtis' Bot. Mag. t. 8782 (1918); Hilliard & Burtt, Jl. S. Afr. Bot. 50(3): 287 (1984). Type: Transkei, Kentani distr., in valleys and along streams, 1500 ft., Feb. to May 1903, Pegler 401 (K, holo!, BM!, BOL!, SAM!, PRE! iso. (401a).

Perennial herb, stems one to several from the crown, simple or branched, up to 1200 mm long, rectangular in cross-section with a ridge on each corner, up to *ca.* 4 mm on a side, erect to decumbent or scrambling up through other shrubs, glabrous. *Leaves* opposite and decussate, glabrous, gradually reduced in size upwards, lamina (12–)28–44(–70) × (6.5–)24–38(–48) mm, ovate to deltoid, apex acute, base truncate to cordate, margins serrate, serrations apiculate; petioles 1.0–5.0 mm long, with a tuft of glandular trichomes in the axils and on adjacent node. *Flowers* mostly alternate in lax racemes or panicles, racemes up to 180 mm long; bracts glabrous, lowermost subtending the racemes, mostly leaf-like, *ca.* 5.5–19.0 × 2.5–8.0 mm, opposite, ovate, apex acute, base cordate, margins serrate, uppermost subtending flowers smaller, *ca.* 3.5–7.0 × 1.0–3.5 mm, ovate, apex long acuminate, base truncate to cordate, margins serrate or entire; pedicels *ca.* 4.0–18 mm long, filiform, ascending, becoming more horizontal and perpendicular to the developing capsule in fruit, glandular pubescent. *Calyx* lobes five, upper lobe *ca.* 2.0–3.0 × 0.6–0.8 mm, lateral lobes *ca.* 2.2–3.1 × 0.6–0.8 mm, lower lobes slightly wider, *ca.* 2.5–3.5 × 0.8–1.0 mm, upper three lobes spreading, lower two reflexed, all lobes lanceolate, apex acute to long acuminate, margins narrowly hyaline and minutely serrulate due to the presence of stiff trichomes, otherwise ± glabrous. *Corolla* bilabiate, limb *ca.* 10.7–15.5 × 10.2–11.9 mm; upper lobes *ca.* 2.5–3.1 × 2.1–2.9 mm, oblong to ovate, apex obtuse, base strongly oblique; lateral lobes *ca.* 2.8–4.2 × 3.6–4.5 mm, broadly ovate to deltoid, apex obtuse to acute, base ± perpendicular to the axis of the lobe or only slightly oblique; lower lobe *ca.* 5.0–7.9 × 4.2–7.5, broadly oblong or obovate to ovate, apex rounded to subacute, base perpendicular to the axis of the lobe; all lobes purplish pink on front and purplish white to purplish grey on rear; base of upper lobes purplish red to greyish magenta; tube below upper lobes distended to form an elliptic, shallowly concave, translucent region or 'window', window *ca.* 1.0–1.4 × 2.3–2.5 mm, yellow on inside, greenish-yellow on the outside, mostly obscured on inside by the erect stamens; tube at base of lateral lobes spurred; spurs *ca.* 5.7–7.9 mm long (measured along inner side), projecting back in parallel and curving first down and then forward, sometimes curving inward at the tips, white, with a patch of pale yellow to purple glandular trichomes on the inner face near the tip; gland patch *ca.* 2.0–2.6 mm long; tube below the lower lobe invaginated and raised to form a rounded triangular-shaped keel-like extension of the lower corolla lobe, keel *ca.* 2.0 mm long, with a small inconspicuous patch of *ca.* 18–60 glandular trichomes near the apex; trichomes clear, pale yellow or purple; central portion of tube weakly invaginated to form a shallow poorly developed stamen-bearing boss, boss *ca.* 0.7 mm high anticous to the stamens and 0.8 mm high posticous to the stamens, greyish ruby to bluish-red. *Stamens* four, ± erect, anticous (appearing posticous) filaments *ca.* 2.4–2.7 mm long, ± straight except at the base, posticous (appearing anticous) filaments *ca.* 1.5–1.6 mm long, strongly bent upwards from the middle, all filaments greyish magenta, covered with glandular trichomes; anthers *ca.* 0.5–0.6 mm long, yellow, strongly coherent around the stigma, stigma capitate. *Ovary ca.* 0.9–1.8 × 0.7–0.8 mm, elliptic in outline with *ca.* 9–13 ovules; style *ca.* 1.6–2.1 mm long, deflected upwards, stigma curving forwards. *Capsule ca.* 3.5–6.7 × 2.5–4.0 mm, ovate in outline. *Seeds ca.* 1.1–1.4 mm long, curved, with concentric ridges flanking a central pore on the ventral face, not winged (Figure 2). Chromosome number: 2n=36.

Flowering Time

February to August (based on cited collections and on label notes from Pegler 401b in PRE).

Diagnostic features

D. aliciae is easily recognised and distinguished from D. *racemulosa* on the basis of the elevated keel-like invagination of the corolla tube at the base of the lower corolla lobe, the poorly developed staminal boss, the position of the stamens (erect vs. forward projecting), the form of the posticous filament (sharply bent upwards from near the middle vs. ± straight or slightly curved), the position of the spurs (mostly parallel vs. strongly diverging from the base), and the shorter petioles on the lower leaves (< 7 mm vs. > 7 mm).

Although the tube below the lower corolla lobe is often shallowly invaginated and elevated in *D. racemulosa*, it is blocked from forming a distinct keel by the central position of the stamens in the flower. On the basis of the above diagnostic characters, it is clear that Hilliard and Burtt (1984) based their floral description of *D. racemulosa* Benth. on *D. aliciae* and not on true *D. racemulosa* or a combination of *D. racemulosa* and D. *aliciae*. *Diascia rigescens* also has flowers that are keeled, but in that species, the keel is densely covered with yellow trichomes and forms a conspicuous yellow crest.

Etymology

This species was named by Hiern to honour Mrs. Alice Pegler who first collected this species in the hills around Kentani in 1903.

Distribution and habitat

D. aliciae is known only from the hills and valleys near Kentani in the former Transkei. It has been described as occurring along streams in damp sheltered places by Pegler and on forest margins by Marais. I have observed it in both types of habitats. *Pegler 401c* (PRE) describes *D. aliciae* as a fugitive and this suggests that the plant can occasionally become weedy, however, the extent to which this occurs needs to be verified by additional observations. Like *D. racemulosa*, it favours damp, sheltered, S-facing slopes in thickets on forest margins. It grows in rich, black, clay loam, soil. *D. aliciae* and *D. racemulosa* are not known to occur closer together than approximately 90 km (Figure 3), but the intervening areas of the former Transkei have not been well collected and it is possible that additional exploration will narrow the geographical gap between the two species.

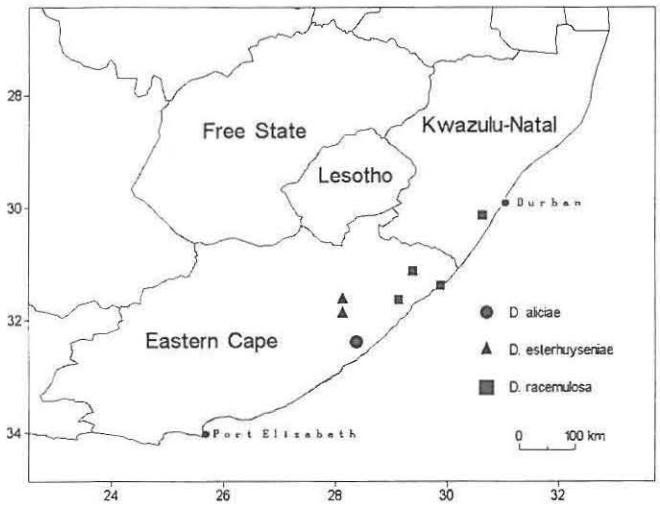

Figure 3 Known distribution of *D. esterhuyseniae*, *D. aliciae* and *D. racemulosa*.

Pollination and breeding system

D. aliciae is self-incompatible and, therefore, dependent on pollinators to set seed. Oil secreted in the twin spurs acts as a pollinator reward for solitary, oil-collecting, bees. No bees have been caught on *D. aliciae*, because only a few isolated individuals have been located so far. However, the similarity in habitat to *D. racemulosa* suggests that the same recently discovered species of *Rediviva* bee that pollinates *D. racemulosa* will also prove to be the pollinator of *D. aliciae* (Steiner unpubl.). There is no strong barrier to hybridisation between *D. racemulosa* and *D. aliciae* (a hybrid has been generated in cultivation), but because the two species have different stamen orientations, it is unlikely that hybridisation would occur in nature even if they were found growing in close proximity.

Specimens examined

Eastern Cape

—3228 (Butterworth): 3.8 miles NW of Kentani (–AD), 10 Mar 1955, *Marais 736* (K, PRE); Butterworth–Kentani road, 23.7 km S of intersection with the N2 in Butterworth, elev. *ca.* 500 m (–AD), 22 Feb. 1984, *Steiner 604* (MO, NBG, PRE); Kentani Distr., valleys, elev. *ca.* 375 m, (–AD), Feb. 1912, *Pegler 401b* (PRE); Kentani Distr., valleys, fugitive, elev. *ca.* 375 m (–AD), Apr., 1914, *Pegler 401c* (PRE); 26.3 km S of N2 at Butterworth, on road to Kentani, elev. *ca.* 600 m (–AD) 15 Apr. 1997, *Steiner 3204* (MO, NBG, PRE).

Locality uncertain

Ex Herb. Hort Bot. Reg. Kew from seed sent by Prof. Pearson, Cape Town (voucher for t.8782 in Curtis' Bot Mag.), pressed Oct. 9, 1916 (K, PRE).

3. ***Diascia racemulosa*** Benth. in Hook. Comp. Bot. Mag. 2: 17 (1836) et in DC. Prodr. 10: 259 (1846); Hiern in Thiselton-Dyer, Fl. Cap. 4(2): 156 (1904); Hilliard & Burtt, Jl. S. Afr. Bot. 50 (3): 287 (1984). Type: Pondoland [E. Cape], bushy places in valleys, between Umtata River and Umzimkulu River, 1000–2000 ft., May 1831, *Drége 4849* (K holo!; E iso)

D. expolita Hiern in Thiselton-Dyer, Fl. Cap. 4 (2): 156 (1904). Type: Natal, Farm Ismont [near Mid Illovo](3030BA), 2000 ft., April 1883, *Wood 1841* (K, holo!; NH!, SAM! iso).

Perennial herb, stems one to many from the crown, crown eventually woody and up to 30 mm in diameter, stems simple or branched, up to 1350 mm long, rectangular in cross-section with a ridge on each corner, up to *ca.* 5.5 mm on a side, erect to decumbent or scrambling up through other shrubs, glabrous. *Leaves* opposite and decussate, glabrous, 20–63(–70) × 13–50(–51) mm, gradually diminishing in size upwards, broadly ovate to deltoid, apex acute to acuminate, base truncate to cordate, margins serrate, serrations apiculate, petioles 3.0–23.0 mm long, mostly > 7 mm, with a tuft of glandular trichomes in the axils and on adjacent node. *Flowers* mostly alternate in lax racemes or panicles, racemes up to 350 mm long, upright or hanging down, bracts subtending the racemes, *ca.* 3.5–13.0(–17.0) × (1.8–)2.5–7.5(–15) mm, leaf-like, petiolate, ovate to deltoid, apex acute, base truncate, margins serrate, upper bracts subtending flowers reduced, sessile, *ca.* 2.0–4.0 × 1.0–1.5 mm, broadly ovate to deltoid, apex acuminate, base truncate to cordate, margins entire to subentire with scale-like thickened non-glandular trichomes especially near the tips, glabrous or with a few scattered glandular trichomes, pedicels *ca.* 8–24 mm long, filiform, reflexed and curving upwards distally in fruit, glabrous or with scattered glandular trichomes, especially at the base and in the axils with the inflorescence axis. *Calyx* lobes five, upper lobe *ca.* 2.6–2.7 × 1.0–1.1 mm, lateral lobes *ca.* 2.8 × 1.1 mm, lower lobes slightly longer and wider, *ca.* 3.1–3.4 × 1.3 mm, upper three lobes spreading, lower two lobes reflexed, all lobes lanceolate, apex acute to short acuminate, margins narrowly hyaline, with stiff trichomes especially near the tips, otherwise ± glabrous. *Corolla* bilabiate, limb *ca.* 13.8–20.4 × 13.8–18.1 mm, upper lobes 2.1–3.7 × 3.8–4.3, ovate to broadly ovate or deltoid, apex rounded, base strongly oblique, lateral lobes 3.1–5.5 × 4.5–6.2, broadly ovate to deltoid, apex rounded, base strongly oblique, lower lobe *ca.* 6.7–11.3 × 7.8–12.2 mm, oblong to obovate, apex rounded to subacute, base perpendicular to the axis of the lobe, usually bearing a patch of glandular trichomes that extends into the tube, all lobes pink to pale red on front and pinkish white on rear, margins glandular pubescent; tube below upper lobes distended to form an elliptic, concave, translucent region or 'window', window *ca.* 2.2 × 2.9–4.5 mm, yellow on inside, greenish-yellow with red blotches on the outside; tube at base of lateral lobes spurred, spurs *ca.* 8.9–11.0 mm long (measured along inner side), initially diverging and then curving down or inward near the tips like two sides of a horseshoe, reddish grey, tips curving forward somewhat, tapering or bulbous, bearing a patch of pale red to clear glandular trichomes on the inner face near the tip, gland patch *ca.* 2.9–4.7 mm long, greyish magenta; tube below the lower lobe invaginated to form a ± broad, triangular to rounded raised palate-like extension of the lower corolla lobe, extension *ca.* 1.2–1.6 mm long, usually bearing few to many glandular trichomes, base of invagination forming two shallow, parallel depressions to accommodate the stamens; central portion of tube invaginated to form a stamen-bearing boss, boss *ca.* 0.9 mm high anticous to the stamens and 1.7–2.7 mm long posticous to the stamens, red to pale red. *Stamens* four, projecting forwards, anticous (appearing posticous) filaments *ca.* 2.1–2.6 mm long, ± straight except at the base, posticous (appearing anticous) filaments *ca.* 1.7–1.8 mm long, ± straight or curving upwards slightly, all filaments white, with a few glandular trichomes or glabrous, anthers *ca.* 0.7–1.0 mm long, yellow, strongly coherent around the stigma, stigma capitate. *Ovary ca.* 1.1–1.3 × 0.95 mm, elliptic to ovate in outline, green, with *ca.* 12–16 ovules; style *ca.* 1.9–2.3 mm long, deflected slightly upwards. *Capsule ca.* 3.3–4.8 × 2.4–3.4 mm, obovate to elliptic in outline. *Seeds ca.* 1.6–1.75 mm long, curved, with concentric ridges flanking a bulbous swelling with a central pore on the ventral face, not winged (Figure 4). Chromosome number: 2n = 36.

Flowering time

March to July.

Diagnostic features

Diascia racemulosa is very similar to *D. aliciae* vegetatively and in the diffuse nature of the highly branched inflorescence,

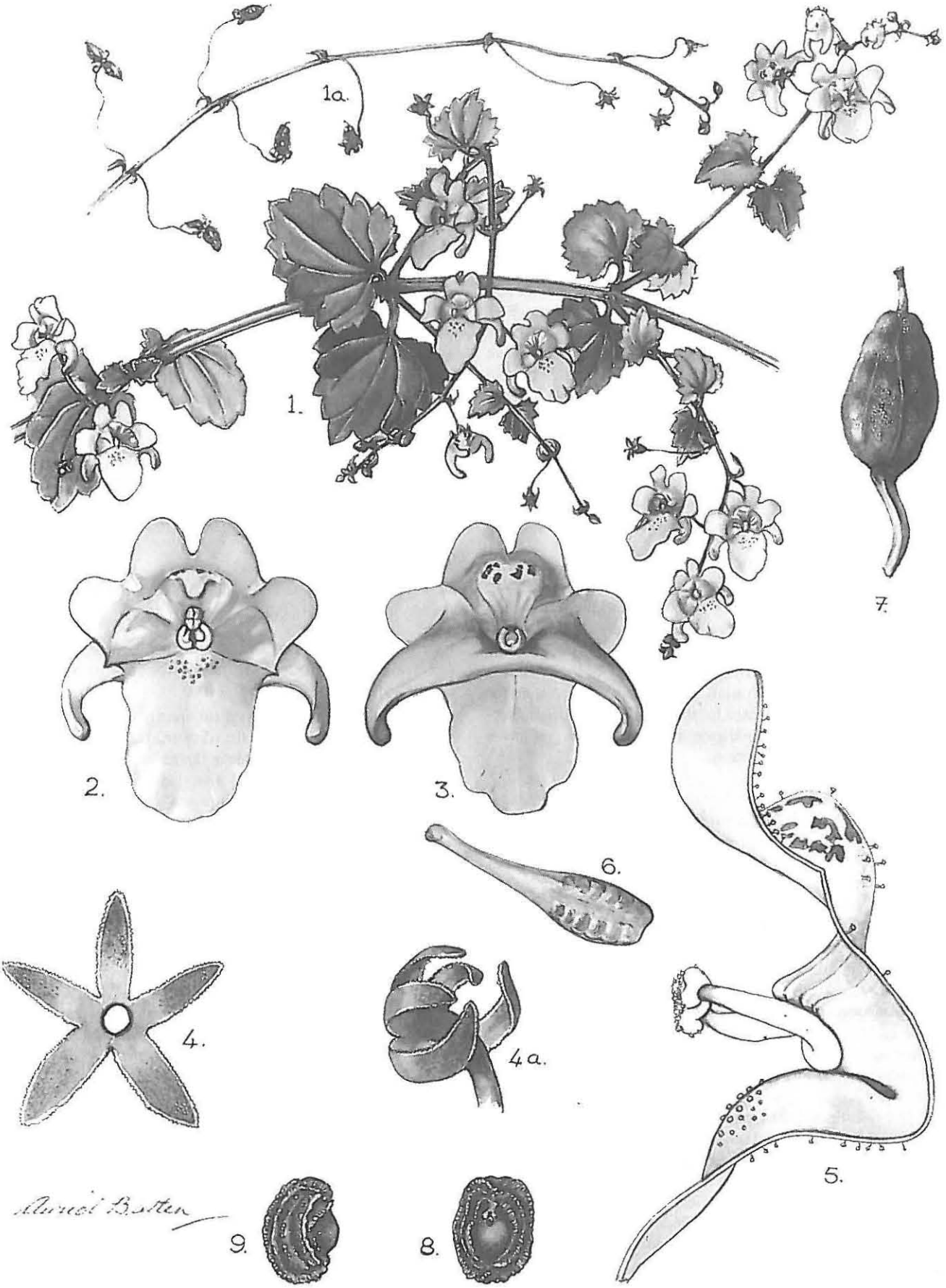

Figure 4 *Diascia racemulosa*. **1**. Habit ×1 **2**. Flower, front view ×3.8. **3**. Flower, rear view ×3.8. **4**. Calyx ×6. **4a**. Calyx attached to pedicel, lateral view ×6. **5**. Flower, longitudinal section ×12. **6**. Gynoecium ×12. **7**. Mature capsule ×6. **8**. Seed, ventral view ×12. **9**. Seed, lateral view ×12. Illustration from *Steiner 3110*.

however, the flowers are clearly distinct. *D. racemulosa* is easily recognised and distinguished from *D. aliciae* because it lacks an elevated keel-like invagination of the corolla tube at the base of the lower corolla lobe, it has a well-developed staminal boss, its stamens project forward, not upward, its posticous filament is ± straight or slightly curved, not sharply bent upwards from near the middle, its spurs are strongly divergent from the back of the corolla, not ± parallel, and its petioles on the lower leaves are longer than 7 mm, not less than 7 mm. Although the tube below the lower corolla lobe can be shallowly invaginated and elevated in *D. racemulosa*, it is blocked from forming a distinct keel, like that of *D. aliciae* by the central position of the stamens in the flower.

Diascia racemulosa is also similar to *D. mollis*, but it differs from that species in having only non-glandular thickened hairs on the calyx (restricted to the margins and tips) not glandular trichomes throughout. *D. racemulosa* also has longer spurs (8.9–11.0 vs. 3.5–7.0 mm), that diverge at nearly right angles to the floral axis before curving downward. These two features make the spurs visible from the front of the flower, since they project beyond the margins of the lateral and lower corolla lobes (Figure 4). The spurs of *D. mollis* are not visible from the front of the flower. Other differences between these two species include filament length (shorter in *D. racemulosa*), style length (shorter in *D. racemulosa*) and seed length (longer in *D. racemulosa*). *D. racemulosa* also differs from *D. mollis* in chromosome number (Steiner 1996). *D. racemulosa* is tetraploid (2n = 36), while *D. mollis* is diploid (2n = 18).

Hilliard and Burtt (1985) considered *Diascia racemulosa* (including *D. aliciae*) and *D. mollis* to be annuals and, therefore, envisioned a link between these two species and the five annual species endemic to the Cape region. However, although these species often have poorly developed fibrous root systems, they are perennial and survive periods of drought by dying back to a subterranean crown. In cultivation, a plant may be kept alive for many years. This is not the case for the five Cape annuals in section Racemosae. They are obligate annuals and never survive more than 6 months in cultivation.

Distribution and habitat

The distribution of *D. racemulosa* is poorly known and based on only a few collections. Until recently, it had been collected only twice in this century. It is currently known from a limited area of the former Transkei, from near Double Falls, (halfway between Umtata and Port St. Johns) to 20–30 km south of Tabankulu. The collection in the last century by Wood from Farm Ismont near Mid-Illovo in southern Kwazalu-Natal (*ca.* 160 km NE of the northernmost Transkei location), suggests that this species had a much wider distribution in the past. Hilliard and Burtt (1984) searched unsuccessfully for *D. racemulosa* at the Kwazulu-Natal location and found that the area had been severely disturbed by the planting of sugar cane and exotic timber plantations. They were unable to find any trace of the plant and presumed it to be extinct there.

J.P. Drége collected the type of *D. racemulosa* during his 1831 expedition through coastal Transkei. He collected it between the 12th and 17th of May somewhere between the Umzimkulu and Umtata Rivers. During his expedition, Drége stayed for a few days at Bunting Mission Station (Gunn & Codd 1981) which is within 10 km of the Double Falls collection site. Therefore, it is very likely that his collection was made somewhere near the Mission Station.

Pollination and breeding system

D. racemulosa, like *D. esterhuyseniae* and *D. aliciae* is self-incompatible and, therefore, requires pollinators to set seed. At the site near Double Falls, it is pollinated by an undescribed species of *Rediviva* (Melittidae), an oil-collecting bee that is so far known from this single locality. Its relationship to the other oil-collecting bees that visit *Diascia* and other oil-secreting plants will only be known once males can be examined and compared to other *Rediviva* species. Artificial crosses between *D. racemulosa* and *D. aliciae* result in normal seed set and suggest that crossing barriers between these two species are weak. This is not surprising; since most members of *Diascia* section *Racemosae* that share the same chromosome number (e.g. 2n = 36) are cross compatible (Steiner unpubl.).

Specimens examined

Eastern Cape

—3129 (Port St. Johns): 21.6 km S of Tabankulu on road to Flagstaff, 5.1 km S of turnoff to Mtukuzi, elev. *ca.* 910 m (–AB), 29 May 1996, *Steiner 3110* (NBG, MO, PRE, K.); 29.2 km S of Tabankulu on road to Flagstaff, 10.3 km S of turnoff to Mtukuzi, elev. *ca.* 680 m (–AB), 29 May 1996, *Steiner 3111* (NBG, PRE); Bomvini, near Bambisan Hospital, Lusikisiki Dist. (–AB), 3 March 1998, *Cloete 4864*; 7 miles from Spes Bona on road to Mtontsasa (–BD), 8 July 1976, *van Wyk 1537* (PRE); 4 km from Port St. John's–Umtata road (R61) on road to Ngqonleni/Double Falls (–CA), 6 Apr. 1994, *McClellan & Matolweni 372* (K, KEI, MO, NBG, NU, PRE); Road to Double Falls, 3.7 km S of Umtata–Port St. John's Road (R61), elev. *ca.* 700 m, (–CA), 30 May 1996, *Steiner 3112* (E, MO, NBG, NU, PRE); ibid., 17 Apr. 1997, *Steiner 3206* (NBG, PRE).

Inexact locality

Eastern Cape–Pondoland, ex hort. Kirstenbosch, March 1933 *Robinson 376/33* (NBG, PRE).

Key to the species of *Diascia* in the former Transkei (excluding the mountainous border region with Lesotho)

Corolla keeled or personate; stamens erect or at least one pair erect, enclosed in, or obscuring, the window(s).
- Flowers personate, white or tinged pink; corolla spurs poorly developed, usually < 3 mm long and lacking glandular trichomes inside near the tips . . . . . *D. personata*
- Flowers keeled, pink or purplish-pink; corolla spurs well developed (> 3 mm long) and containing glandular trichomes near the tips
  - Keel covered with a dense patch of yellow trichomes; stems erect; leaves sessile . . . . . *D. rigescens*
  - Keel with a patch of trichomes (or rarely wanting), but trichomes not densely packed together and not yellow (mostly dark purple); stems lax; leaves petiolate, large and broad . . . . . *D. aliciae*

Corolla not keeled or personate; stamens projecting forward, window conspicuous at base of upper corolla lobes
- Windows usually two, in a shallow concavity . . . . . *D. esterhuyseniae*
- Windows one, deeply concave
  - Spurs broadly divergent; calyx glandular pubescent; anticous stamens < 2.8 mm long . . . . . *D. racemulosa*
  - Spurs not broadly divergent; calyx glabrous except on the margin and apex of the lobes; anticous stamens > 3.0 mm long . . . . . *D. mollis*

Acknowledgements

I thank Elize Cloete for collecting live and preserved material of *D. esterhuyseniae* and *D. racemulosa* and for accompaning me to the type locality of *D. esterhuyseniae* and to populations of *D. racemulosa*. I also thank A. Batten for illustrating *D. esterhuyseniae* and *D. racemulosa* and the late E. Ward-Hilhorst for

painting *Diascia aliciae*. E.G.H. Oliver kindly checked the Latin diagnosis for *D. esterhuyseniae*.

References

GUNN, M. & CODD, L.E. 1981. Botanical exploration of Southern Africa. Balkema, Cape Town.

HILLIARD, O.M. & BURTT, B.L. 1984. A revision of *Diascia* section *Racemosae*. *Jl. S. Afr. Bot.* 50: 269–340.

HILLIARD, O.M. & BURTT, B.L. 1988. Notes on some plants of southern Africa chiefly from Natal XIV. *Notes from the Royal Botanic Garden Edinburgh* 45: 87–88.

STEINER, K.E. 1989. A new species of *Diascia* (Scrophulariaceae) from the southern Drakensberg. *S. Afr. J. Bot*: 55: 250–253.

STEINER, K.E. 1996. Chromosome numbers and relationships in tribe Hemimeridae (Scrophulariaceae). *Syst. Bot.* 21: 63–76.

STEINER, K.E. & WHITEHEAD, V.B. 1988. The association between oil-producing flowers and oil-collecting bees in the Drakensberg of southern Africa. In: Modern systematic studies in African Botany, eds. P. Goldblatt & P.P. Lowry. *Monogr. Syst. Bot. Missouri Bot Gard.* 25: 259–277.

STEINER, K.E. & WHITEHEAD, V.B. 1990. Pollinator adaptation to oil-secreting flowers—*Rediviva* and *Diascia*. *Evolution* 44: 1701–1707.

STEINER, K.E. & WHITEHEAD, V.B. 1991. Oil flowers and oil bees: further evidence for pollinator adaptation. *Evolution* 45: 1493–1501.